

CLAIMS

What is claimed is:

1. A method for fixing a first pipe in an open hole in the ground by filling an outer annular space between the outside of the first pipe and walls of the open hole with cementitious material, the method comprising:

placing the first pipe in the open hole such that a gap is provided to allow cementitious slurry and water to flow from a bottom end of the first pipe into the outer annular space;

sealing a top end of the first pipe with a cover plate, wherein the cover plate is provided with a throat therethrough;

inserting a second pipe through the throat such that a bottom end of the second pipe is in proximity to the bottom end of the first pipe and a top end of the second pipe is above the cover plate, whereby an inner annular space is created between an outside of the second pipe and an inside of the first pipe;

sealing the second pipe in the throat;

substantially filling the inner annular space with water;

pumping cementitious slurry into the top end of the second pipe such that the cementitious slurry exits the bottom end of the second pipe and passes through the gap into the outer annular space and moves upward through the outer annular space pushing water up and out of the outer annular space, and continuing pumping until the outer annular space is substantially filled with cementitious slurry;

allowing the cementitious slurry to set and removing the second pipe.

2. The method of Claim 1 further comprising:

providing a plug receiver at the bottom end of said second pipe; and

after the outer annular space is substantially filled with cementitious slurry, forcing a plug down the second pipe to the plug receiver before the cementitious slurry sets, thereby displacing substantially all of the cementitious slurry out of the second pipe.

3. The method of Claim 1 wherein the second pipe further comprises a detachable bottom end section.
4. The method of Claim 3 wherein the detachable bottom end section is connected to the second pipe with a threaded coupler, wherein said coupler is threaded onto said first pipe and said detachable bottom end section in opposing directions..
5. The method of Claim 1 further comprising providing an annulus aperture passing through the cover plate, and a valve operative to open and close the annulus aperture.
6. The method of Claim 5 wherein air is released from the inner annular space through the annulus aperture while the inner annular space is filling with water.
7. The method of Claim 5 wherein the water is removed from the inner annular space by pumping air through the annulus aperture and forcing the water up the

second pipe and out the top end of the second pipe.

8. The method of Claim 1 wherein the cover plate which is used to seal the top end of the first pipe includes an inflatable seal attached to the cover plate and adapted to mate to an inside rim of the first pipe;

wherein the inflatable seal can be inflated to seal the cover plate to the top end of the first pipe and deflated to remove the cover plate from the top end of the first pipe.

9. A sealing apparatus for sealing an end of a pipe comprising:

a cover plate adapted to cover the end of the pipe; and

an inflatable seal attached to the cover plate and adapted to mate to an inside rim of the pipe;

wherein the inflatable seal can be inflated to seal the cover plate to the end of the pipe and deflated to remove the cover plate from the end of the pipe.

10. The apparatus of Claim 9, further comprising a first aperture passing through the cover plate and into the inflatable seal and a first valve operative to open and close the first aperture.
11. The apparatus of Claim 10, further comprising a second aperture passing through the cover plate and into the inflatable seal and a second valve operative to open and close the second aperture.
12. The apparatus of Claim 9 wherein said inflatable seal is inflated with a gas.
13. The apparatus of Claim 9 wherein said inflatable seal is inflated with a liquid.
14. The apparatus of Claim 9 further comprising a safety clamp to attach said cover plate to said pipe.
15. The apparatus of Claim 14 wherein said safety clamp comprises a collar

attachable to said pipe and at least one tether attachable between said collar and said cover plate.

16. The apparatus of Claim 15 further comprising a tightener operative to tighten said at least one tether after the collar is attached to the outside rim of the pipe, and thereby secure the cover plate to the end of the pipe before the inflatable seal is inflated.
17. The apparatus of Claim 15 wherein the safety clamp provides some slack when attached.